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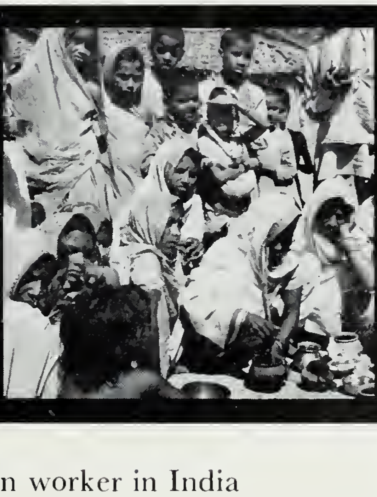
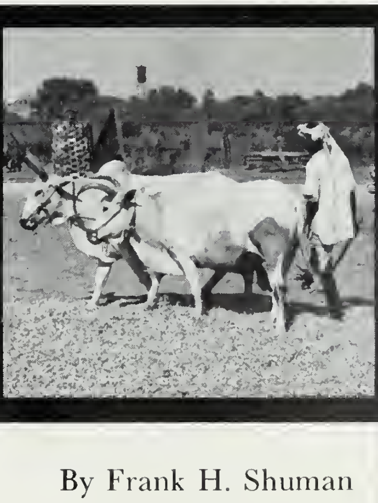




xperiences of a United States agricultural extension worker in India

By Frank H. Shuman

Published by the
University of Illinois
College of Agriculture
in cooperation with the
Allahabad Agricultural Institute
and the International Cooperation
Administration

Published at Urbana, Illinois
May, 1957

A WORD ABOUT THIS REPORT . . .

Frank H. Shuman, author of this report, spent two years at the Allahabad Agricultural Institute under assignment from the University of Illinois, his term of service extending from January, 1953, to April, 1955. His assignment was part of a program of inter-university collaboration sponsored by the International Cooperation Administration.

Mr. Shuman brought with him to India a philosophy of education and a knowledge of teaching techniques gained through many years of agricultural extension work in Illinois. This report is largely an expression of his philosophy and a description of his methods as he applied them to the task of training extension workers. It includes ideas and suggestions that should be helpful to others who are embarking upon a career of agricultural extension or who are conducting a training program similar to the one at Allahabad.

Since the collaboration program between the University of Illinois and the Allahabad Agricultural Institute was begun in 1952, the following specialists have gone from Illinois to Allahabad: Mr. Shuman, Professor M. H. Alexander, Professor Florence Kimmelshue, Dr. G. H. Dungan, Dr. Alex Reed, Dr. T. Wilson Longmore, Miss Jeanette Dean, Professor W. H. Tammeus, and Dr. W. J. Foreman. During the same period nine members of the Institute staff have come to the University of Illinois for advanced training. The cost of the program has been financed by funds assigned under contract to the University of Illinois by the International Cooperation Administration. — Deane G. Carter, Coordinator, International Cooperation Programs, University of Illinois.

ALLAHABAD—A MUST

EVEN IF I HAD WANTED TO, I could not have said no when I was offered a two-year assignment at the Allahabad Agricultural Institute. As a small boy I had often heard my father, an Illinois farmer, talk about the Institute and had seen him respond generously to its financial needs. Later, when my two sons went to war, I resolved that if ever I had an opportunity to help build a peaceful world I would do so. Now was a chance to do my part toward developing good will and understanding between nations. I knew that I had to take this opportunity — that I must go to Allahabad.

My opportunity resulted from a program of inter-university collaboration sponsored and financed by the U. S. Technical (later International) Cooperation Administration and conducted under a contract by the University of Illinois. Under this arrangement, University specialists assisted the staff at Allahabad for two-year periods and members of the Institute staff came to study at Illinois.

Several such programs had grown out of the U. S. Government's Point IV plan for technical assistance. This particular one, however, was established largely through the efforts of Dr. Arthur T. Mosher, an Illinois graduate and a member of the Institute staff since 1936. His association there was for me another link with the past. For his father, M. L. Mosher, had been farm adviser in my home county many years ago.

Before I went to the Institute I knew that in 1910 Sam Higgenbottom had established it by the Jumna river on land badly scarred by erosion. When I arrived there in January, 1953, I found a developed area of about 400 acres producing various horticultural and field crops and supporting a good dairy herd. Six new buildings had been designed for classrooms and administrative offices. In addition, two hostels accommodated over 300 men and there was also a small dormitory for women. The staff were comfortably housed in 25 or more residential units.

Affiliated with Allahabad University, the Institute offers degrees in agriculture and also conducts programs in research and extension. In 1952, Dr. Mosher inaugurated special training courses in extension work. Nearly 400 trainees took the courses between July 1, 1952, and May 15, 1955. Over 100 of them were students enrolled at the Institute. The Indian government selected the other trainees from the teaching staffs of the 34 extension training centers scattered over the country.

The spacious brick house assigned to my wife and me was soon named "State and Madison" after Chicago's busiest intersection. Around our Indian home are centered happy memories of student-faculty song fests, evenings spent playing games, pleasant tea-time chats, and visits with the many world travelers who stopped with us.

These extension trainees will be the leaders of tomorrow. What they have learned will be passed on to others. If they are taught effectively, they in turn will be able to teach well.

Although I was assigned to India as an extension specialist, my principal work turned out to be helping with these training courses. From October, 1953, until my departure in 1955, I was director of the training program. In all my work in India, I tried to implement the extension philosophy that I had acquired as a county farm adviser in Illinois — that extension is not to go out and do things for people, but to help them help themselves. Although I was dealing directly with extension workers, it was the people in the villages of India whom I eventually wanted to reach.

The first part of my job, as I saw it, was to have "something to extend." Since my special interest was soils, I felt that I could make the greatest contribution by studying the soils and finding ways to increase their productivity. This meant studying the crops, too, to see which ones were best adapted and how they would respond to treatment.

Next I wanted to know the people. Essentially, I felt, they would be the same in India as in America. But I knew that there were also great differences in custom, tradition, and way of life.

Finally, I had to devise teaching methods that would effectively reach the people and motivate them to action.

Trainees work in their gardens at the Institute.

I HAD TO KNOW SOILS AND CROPS

My introduction to India began during the three-hour automobile trip from the Banaras airport to the Institute. The driver said that we were passing through the heart of the densely populated Gangetic valley.

Even from a moving car the hunger signs of the crops were evident — especially the signs of nitrogen starvation. I had seen such signs in Illinois fields after only 100 years of farming. Surely it was not surprising to find them in an area which had been under cultivation for 3,000 years.

Starved crops meant half-fed sheep and cattle. Thousands of them ranged along the highway, feeding on straw, roadside weeds, and tree leaves. More important, poor yields meant that there wasn't enough food for the people.

Examining the land around the Institute, I became increasingly convinced that the soils in the area needed nitrogen more than anything else. Tests of soil samples taken from the Institute farms indicated that calcium and magnesium were abundant, and that there were also medium amounts of phosphorus and potassium, though not enough for highest yields.

Thus, the first step in my program became evident. I would set up plots at the Institute to find out what could be done with suitable fertilizers and good practices. Although these plots were not designed as scientific experiments, they did indicate that tremendous increases in India's food and feed production are possible. As "demonstration plots," they were to become a valuable teaching tool.

A ready-made opportunity. Hoeing weed-infested maize showed the value of clean cultivation.

For further information, I eagerly turned to the results of research being done at the Institute. Particularly helpful were research plots designed by Dr. George Dungan, University of Illinois agronomist, and G. D. Singh, manager of the Institute farm; and legume and forage experiments initiated by Professor M. H. Alexander, also from the University of Illinois.

Nitrogen and weeding are tried on maize

Circumstances alter plans. Demonstration plots in 1953 strikingly illustrated the value of nitrogen and weed control, although that was not precisely their original purpose. Actually the plan had been to show the effects of phosphorus, potassium, and nitrogen on maize. But when Professor Alexander and I returned from visiting a hill station in June, we found that the fertilizer shipment had not arrived and that only ammonium sulfate was available.

At once we went in search of a field where potassium and phosphorus tests were high and where chemical nitrogen would give a response. But when we found the best spot, the weeds were as high as the maize, for the monsoon had come early that year. If we were to apply nitrogen to the field now, all we would measure would be the response of weeds to this element.

We soon realized, however, that we had a ready-made opportunity for a good demonstration. By hoeing out the weeds, we could show not only the response of maize to extra nitrogen, but also the effects of clean cultivation.

Six village boys and John Velu, of the Institute staff, helped to hoe out the weeds from 64 rows in the center of the field. Each row was about 64 feet long, and the distance between rows averaged 27 inches.

The hoed area was divided into four equal plots, each comprising 16 rows and measuring

Maize on the left received nitrogen after it was weeded — that on the right was weeded only. There could be no doubt about the value of nitrogen.

1/30 acre. The first plot received no additional treatment. To the second one, 40 pounds of nitrogen per acre were applied broadcast. The third plot had 80 pounds of nitrogen applied broadcast, while the fourth one had 80 pounds of nitrogen placed 3 inches deep and 4 inches from the row. This is known as side dressing. All the nitrogen was applied in the form of ammonium sulfate.

The rest of the field was weeded by village women, but only the top growth was cut off — the weeds were not eradicated.

Weeding plus nitrogen gives high yields. The part of the field which had been plowed by oxen and weeded by village women yielded 4.7 tons of green fodder per acre. The plot that was hoed but received no nitrogen yielded 11.7 tons of fodder. This represented a 150-percent increase. The cash value of the 7-ton increase amounted to 221 rupees.

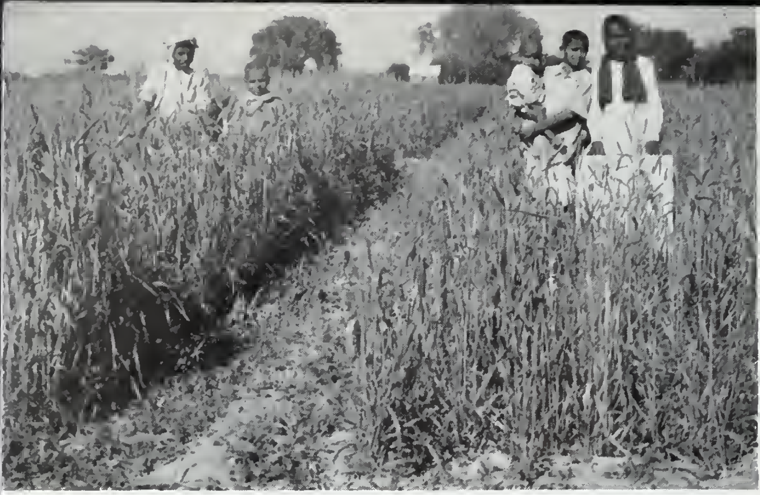
Crows and jackals inflicted such heavy damage on the plots receiving chemical nitrogen that the fodder from these plots could not be measured accurately. However, it was possible to get a fairly good estimate by counting and harvesting the undamaged stalks and then counting the damaged or missing stalks. A yield of more than 16 tons an acre was clearly indicated for each of the two plots receiving 80 pounds of nitrogen. One rupee spent for chemical nitrogen returned five rupees in increased production. The nitrogen content of the fodder was increased 76 percent by hoeing out the weeds and adding 80 pounds of nitrogen.

It appeared to me that all possible sources of nitrogen should be tried in the Indian soil program. With nitrogen the whole cycle of production would be improved. Better crops would mean better feed, better manure, and in turn better crops again.

Weed control on research plots. Maize plots under Dr. Dungan's supervision again showed the value of weeding. Unweeded plots yielded only 12.3 maunds of grain an acre (a maund is 82 pounds). Four shallow cultivations when the weeds were small, however, gave a yield of 47.3 maunds. Weeding with a khurpi (hand hoe) 26 days after planting was much less effective, giving a yield of 19.1 maunds.

In one experiment the weight of the weeds that had been removed was compared with the weight of the crop increase. Weeding the corn meant more feed than if the weeds had been allowed to grow unchecked and used as forage. Not only did weeding increase the quantity of feed, but it also increased the quality. A good crop has more nutritional value for both human beings and animals than do weeds.

Another view of the maize demonstration plots. The pale, stunted, nitrogen-starved maize in the foreground contrasts sharply with the dark, vigorous crop growing on the nitrogen-treated soil.



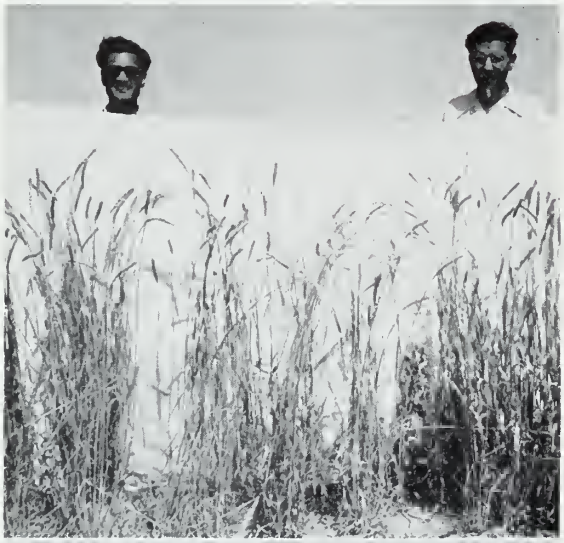
Village children stand in the wheat research plots. Cardboard held by the children in the untreated plots (right) can easily be seen. Wheat treated with nitrogen and phosphorus, however, is so high that it covers the cardboard.

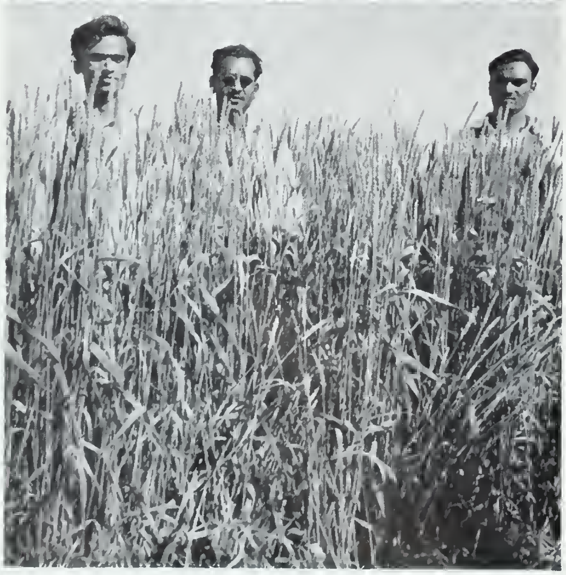
Wheat responds generously to nitrogen

That nitrogen is a sound investment was vividly illustrated by results of experiments that Dr. Dungan conducted with wheat. When applied alone and in combination with phosphorus and with potassium, nitrogen was responsible for an average yield increase of 7.4 maunds an acre. Figured at current prices, the value of this increase was three times the cost of the nitrogen. (Later it was found that phosphorus as well as nitrogen was necessary to maintain high yields.)

On the side of the field nearest a termite-infested hill, the plot receiving nitrogen and phosphorus yielded 26 maunds. This was just double the yield on the check plot, where the nitrogen- and phosphorus-starved plants easily succumbed to the vicious termite attack.

Three forms of nitrogen tried. Wheat in the demonstration plots received nitrogen in three different forms: compost manure, green manure, and chemical nitrogen. Yields were greatly increased by all three forms, as shown by the accompanying illustrations.





Compost manure doubled the yield of wheat (top left). An 11-maund average was boosted to 22 maunds. Turning under a crop of sun hemp gave an average wheat yield of 30 maunds (lower left). A top yield of 37.8 maunds was obtained by adding 40 pounds of chemical nitrogen (below).

Only 26 days' growth of lucern. The acre-yield of 928 maunds obtained on this plot was almost double the top American yield. When displaying this picture on the bulletin board, I used the caption: "India excels. . . . Institute field produces more lucern per acre than Illinois's best."

An amazing acre of lucern

Lucern (alfalfa) seed that had been inoculated with nitrogen-fixing bacteria was planted in a demonstration plot on October 7, 1953. By June 6 seven cuttings had yielded 76,096 pounds or 928 maunds per acre. Included in this yield were 475 pounds of nitrogen.

This astonishing yield resulted from ideal soil, near-perfect temperature, maximum sunlight, and an adequate supply of water. The land was irrigated four days before seeding and six times thereafter.

The lucern demonstration plot was probably on the best soil at the Institute. Nevertheless it showed the possibility of using a bigger acreage of this legume to build up soil fertility.

As irrigation projects are completed, lucern is destined to play a much larger role in Indian agriculture than it has in the past.

Improved varieties give top yields

Research at the Institute indicated that the wheat yield on thousands of acres in India could be doubled just by growing an improved variety. Two wheat varieties commonly grown by the villagers were compared with two new varieties. Each village variety yielded between 16 and 17 maunds per acre. The new Pusa 762 variety yielded over 39 maunds, while Kanpur 13 yielded more than 37 maunds.

Dr. Dungan and a group of trainees inspect soybean variety plots. Pelican (growing at back) yielded twice as much forage as any other variety.

Sun hemp provides nitrogen and organic matter

Sun hemp has been called India's best legume for green manuring. Small wonder when we consider what it did for three succeeding crops at the Institute. Wheat grown after sun hemp had been plowed under yielded 24.8 maunds. This was nearly double the yield of 12.6 maunds on the check plot. Bajra (pearl millet) was seeded next, and then a second crop of wheat. The bajra yield was 14 percent higher on the green-manured plot than on the check plot, and the wheat yield was 28 percent higher.

"Something to extend"

The amazing crop yields on the Institute farm gave me "something to extend." They convinced me that the solution to India's food problem is not more acres, but bigger acres by bigger yields.

For this I believe: **India does not have to remain poor** if she will combine her resources — a very responsive *soil*, abundant *rainfall* in the kharif season, maximum *sunlight*, optimum growing *temperatures*, unused *manpower*—with an educational system that applies soil science to the land, teaches by demonstration, and motivates people to effective action.

I HAD TO KNOW THE PEOPLE

One of the first things I wanted to do in India was to gain a first-hand knowledge of village life. This was essential, I believed, if I were going to teach the trainees how to help the people.

My first chance to visit an Indian village came ten days after I arrived at the Institute. Arrangements had been made for me to stay over-night with M. Siddiqui, a village-level worker in Rampur.

Soon after my arrival in Rampur, I asked to drive the oxen around the sugarcane press as an old man fed stalks into the grinder. Borrowing the club used by the villager who had been driving the oxen, I hit the oxen in precisely the same way as he had. While the villagers yelled with glee, I too yelled the only two Hindi words I knew — "Jai Hind" ("Victory to India").

Next I entered into a contest with the village athlete. He easily out-jumped me, and the villagers shouted their approval. By this time the priest had arrived as well as all the members of the Panchayat or village ruling body.

Through an interpreter six boys were selected to play the game, "I see a ghost" (quickly changed to "I see a horse" when I spotted an Arabian horse in the background). The game ended with a big surprise, the boys sprawling on the ground like tenpins. The adults, as well as the boys, shouted and laughed and clapped their hands. We all knew that communication and good will had been established.

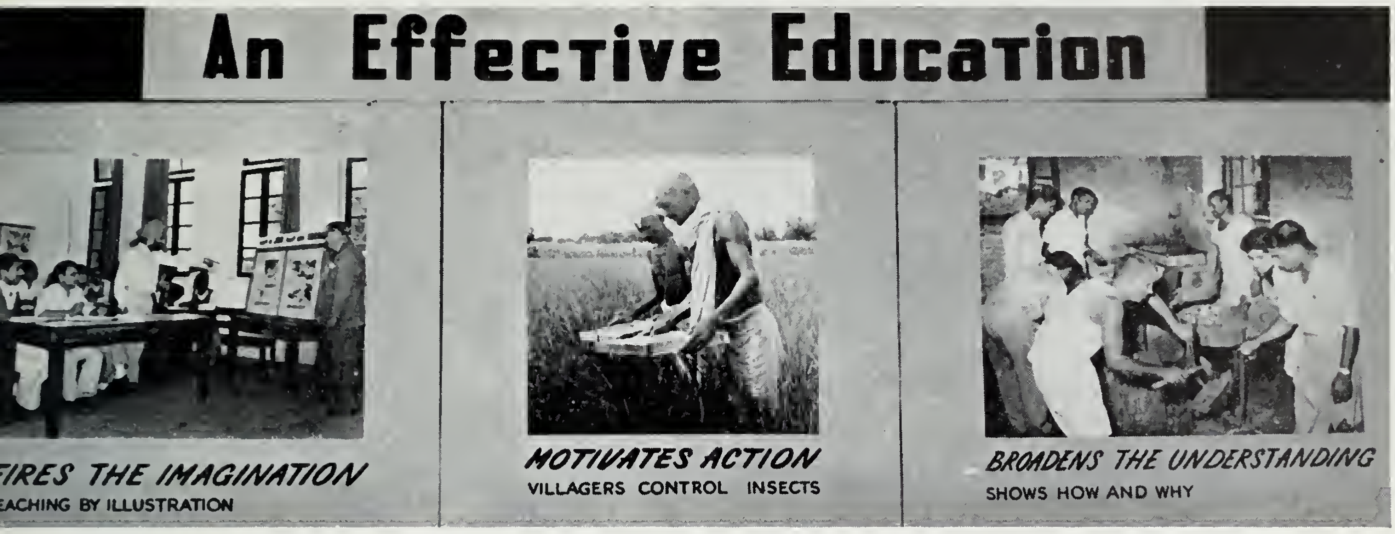
Sometime later I returned to this same village to set up demonstration plots showing the effects of nitrogen on jowar (sorghum). My earlier ice-breaking trip to the village made it easy to secure the cooperation of R. Singh, the tenant farmer on whose land I wanted to establish the plots. Willingly he helped Gaon Sathi Siddiqui and me with the work. Together we side-dressed six rows of jowar with ammonium sulfate at the rate of 60 pounds of nitrogen per acre.

After six weeks had passed, I responded to a knock on my door to find Mr. Singh standing on the step. He had walked 12 miles to ask me to come to his village the next day and look at the plot. He said, "You will never believe what is out there unless you see it."

Of course, I went to the village to inspect the plot and to share Mr. Singh's pleasure in the beautiful response that his jowar had made to the nitrogen. Not only was he delighted with his crop, but he was equally pleased that the gaon sathi and I had taken time to come when he asked us. Naturally I was pleased too — at the success of the demonstration plot, at Mr. Singh's eager pride, and at the friendly greetings from the other villagers, who had not forgotten my visit.

On my trips to other villages, I always found this to be true, just as I had found it true in Rampur and just as I had found it true in America: An extension worker can learn to know people if he really *likes* them, if he tries to *understand* their problems, if he offers them genuine *interest* and *encouragement*, and if he *shares* their work and their play.

". . . Boys sprawling on the ground like tenpins."



I WANTED TO TEACH EFFECTIVELY

One of the most important things I brought to India with me was the concept of an effective education as outlined by Mrs. Kathryn Van Aken Burns of the University of Illinois. An effective education, she said, does three things:

1. Fires the imagination.
2. Motivates action.
3. Broadens the understanding.

To fire the imagination of students so that they would become aware of India's tremendous potential, to arouse their desire to do something about their problems, to broaden their understanding of how and why India's agriculture could be improved — these were the ultimate goals of my teaching program. And whatever the specific aim of a lesson or the particular subject matter being taught, I always kept these goals in mind.

A variety of teaching tools was necessary, both as a means to an end and as an end in itself. For I wanted not only to instruct and inspire the trainees, but also to show them ways of teaching the villagers.

EFFECTIVE EDUCATION FIRES THE IMAGINATION

To "fire the imagination," I used demonstrations and visual aids of various kinds, as well as group discussions and activities. These devices helped to stimulate the students' thinking and kindle their enthusiasm for the job ahead — the job of increasing agricultural production and improving the standard of living in rural India. They also impressed facts and figures upon the memory better than classroom lectures alone would have done. And of course they helped to achieve the other goals of motivating action and broadening the understanding.

Demonstration and research plots show what can be done

The demonstration and research plots at the Institute turned out to be my most effective teaching device. To actually *see* the results of different farming practices impressed the students far more than if I had just told them the results. I hoped that, as their imaginations took fire, they could envision an India made tremendously productive through the use of fertilization, proper cropping, and improved varieties.

Village level workers (gaon sathis) see for themselves the response of jowar to weeding and nitrogen (treated plots shown in background).

Every day I took groups of trainees and other visitors to see the plots. Similarly, Dr. Dungan and Mr. Singh held the attention of class after class as they pointed out the significant features of their research.

Village demonstration plots

In addition to the plots at the Institute, I set up demonstration plots of jowar at five different villages. At each village the jowar was sowed in lines on five plots, and nitrogen in various forms was applied to four of the plots. The nitrogen carriers used were chopped lucern, fresh cow manure, and chemical nitrogen, the latter being applied at two different rates — 40 pounds and 80 pounds of nitrogen per acre. The weeds were kept hoed on all five plots. Surrounding the demonstration plots was jowar grown by a century-old method — as a mixed crop with weeds being allowed to take their heavy toll of nitrogen and other plant foods.

At all the villages the jowar on the demonstration plots showed a tremendous contrast with the traditionally grown crop. Here, for example are the yields obtained at the village of Bara:

Treatment	*Yield of jowar in maunds*
None (mixed cropping)	80
Hoed only	321
Cow manure	367
Green manure (chopped lucern)	392
Nitrogen (40 pounds)	449
Nitrogen (80 pounds)	480

An investment of 30½ rupees in 40 pounds of chemical nitrogen gave a return of 193 rupees or about 630 percent. The return on 61½ rupees spent for 80 pounds of nitrogen was 278 rupees or about 450 percent.

These plots accomplished a number of purposes. First and foremost, they helped give both villagers and extension trainees a vision of what could be done. In laying out the plots, I showed the trainees how they could lay out similar plots in their own extension work. And I gained an abundance of material for tours, bulletin boards, newspaper stories, and classroom lectures.

Drama drives home a lesson

Having shown a class the village demonstration plots, I wanted to emphasize the principles that the trainees should follow in setting up their own plots. To do this I turned to drama, with members of the class acting out the roles.

The chief actor came hobbling into the classroom with his knee tightly bandaged. As he reclined on a bed, he explained his unfortunate predicament. "Yesterday I fell off my bicycle on the way to the Karachna demonstration plots. I was so sorry to miss seeing them. Tell me, were they near a road?"

"Yes, yes," chorused the class. "The first rule in arranging village demonstration plots is that they should be near a road. M. Siddiqui, the gaon sathi at Karachna, didn't miss that point."

Village demonstration plots. Jowar on left was grown as a mixed crop. On the right jowar was seeded alone and sowed in lines. Green manure was plowed under and weeds were removed by hoeing.

"Was the soil uniform and well drained?" asked the disabled man.

"Of course," replied the eldest member of the group. "Uniformity of soil and a well-drained site are two important points that should never be overlooked in selecting a demonstration area."

"Did the villagers help stake out the plots, plant the seed, and apply the various fertilizers which were to be compared?"

Another replied, "The villagers knew everything about the plots, including the planting date and the amount of fertilizer added to each plot. They told about getting three oxen teams to plow the land. They were proud of having helped in the staking and all the operations.

The next two questions were combined into one. "Did the plots show contrast and did the villagers participate in the harvesting?"

Another member of the class then displayed a large print of the photograph shown at the bottom of this page. He said, "The big stack of jowar came from the plot receiving 80 pounds of nitrogen per acre. It weighed 74 percent more than jowar from the check plot!"

The disabled man then concluded, "This convinces me that a picture is worth a thousand words. This shows real contrast! There is no mistake about the villagers helping to harvest the crop. I would call the demonstration a success. Thank you for telling me all about it."

The brief silence that followed was broken by one of the members of the class. "Wouldn't it have been wonderful if Pandit Nehru or S. K. Dey, the community projects administrator, could have seen the demonstration? Let's send them both a picture. It would make them very happy to know about the demonstration method which is being used at the Institute."

Villagers themselves harvested the jowar on the demonstration plots. Here they show the contrast between jowar receiving 80 pounds of chemical nitrogen per acre and that receiving none.

The drama idea grew, with class members writing short skits to illustrate extension methods, slogans, and philosophy. Often a drama was substituted for an examination. Dramas or skits were also performed for the faculty during the evening recreational hours, and for visitors to the Institute. The dramas provided fun and merriment for both participants and audience, as well as a learning experience.

"What is the weight of a cubic foot of soil?"

In addition to the demonstration plots, I tried whenever possible to use simple demonstrations in the classroom. One day I showed my classes a cubic foot of cloddy, non-fertile soil weighing 82 pounds. Everyone who could guess the weight within 10 pounds was to be invited for dinner at the Shuman bungalow. One student collected on the dinner. He guessed the weight exactly.

Next I showed the students a cubic foot of fertile soil. It weighed only 60 pounds. The good soil contained an abundance of organic matter, which weighs much less than run-together clay.

Napier grass and jowar growing on the exact spots from which the two soil types had been taken were also brought to class. Tissue tests with nitrate powder were then made. The cross-section taken from the crop grown on the cloddy soil remained colorless, showing little available nitrogen. In less than one minute, however, the tissues from the plants grown on the soil high in organic matter turned a deep pink, indicating an abundance of available nitrogen.

All the students wanted the magic nitrate-testing powder. However, a field trip showed them that the hunger signs of the crops themselves were just as good an indication of available nitrogen as the magic powder.

There's a lot of milk in this load of lucern.

Pictures arouse interest

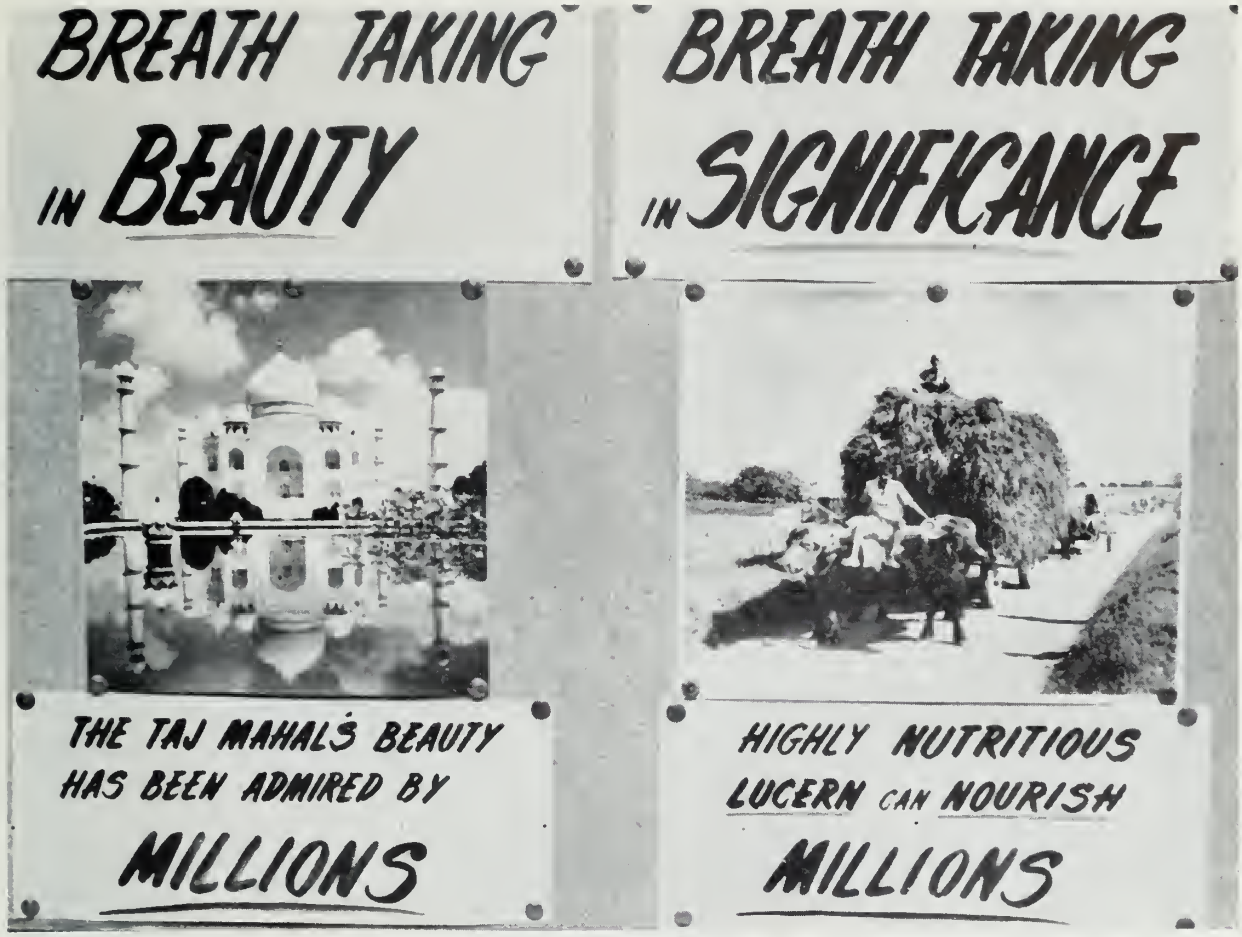
Effective pictures on the bulletin board capture the eye and arouse the imagination. The above picture and caption, I hoped, would stimulate the trainees to think of a good lucern crop in terms of more milk for the children of India. In addition, I used a number of other teaching devices to emphasize both the importance of good clean milk and the ways in which milk production could be increased.

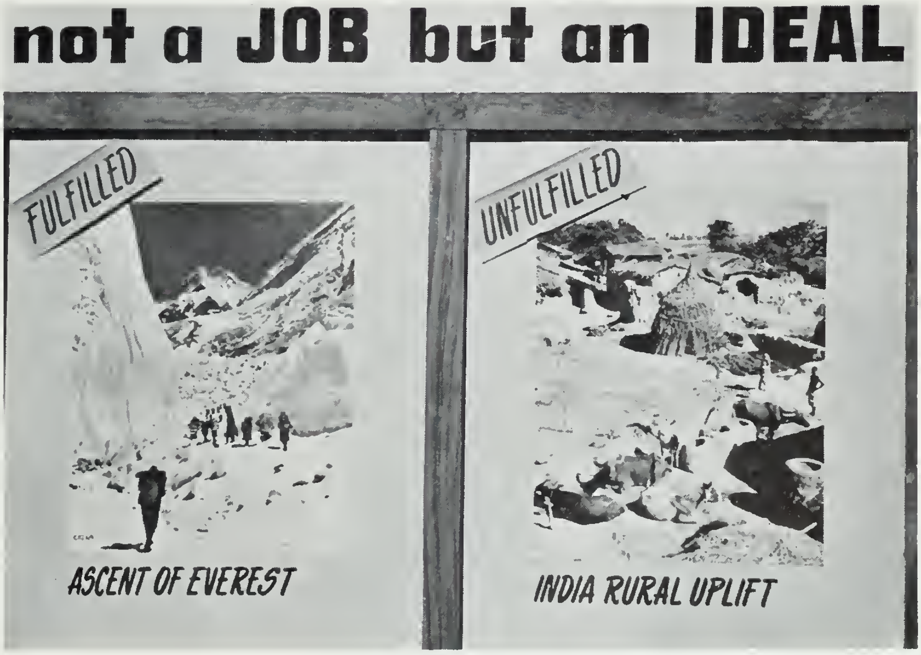
Some topics were developed in classroom discussions — for example, the nutritional value of milk; how to increase milk production by using good dairy rations; how to improve dairy cattle by selection, breeding, and feeding. Other points were brought out during tours that permitted students to actually *see* what was being discussed. Among the tours was a visit to a field of growing lucern. Here the importance of lucern in increasing milk production as well as building up soil fertility was emphasized. On other tours students saw the good condition and large size of well-fed calves; they inspected milk-production records; and they watched the pasteurization of milk and the manufacture of butter, cheese, and ice cream at the dairy plant.

Analogy on the bulletin board

In another bulletin board display, the lucern picture shown above was combined with a picture of the Taj Mahal (*see* opposite page). This analogy was another way of stimulating imagination and thought.

The morning after the Taj Mahal-lucern display appeared on the bulletin board the following points were brought out in classroom discussion: India has 360,000,000 people receiving only 70 percent as many calories per day as they need. And every morning there are 12,000 more mouths to feed than there were the morning before. India has increased her food production





Two bulletin board displays. The prospect of better nourishment for the people of India is as inspiring as the beauty of the Taj Mahal. And achieving the goal of better food production and better living is as great a challenge as Everest.

in recent years, but she must produce still more and better food. She does not have time to wait!

At the end of the discussion one of the trainees exclaimed, "The Taj Mahal is breathtaking in beauty, but you can't eat or wear it!"

A high goal inspires the imagination

A good teacher, I believe, must inspire his students to think in terms of long-time goals or ideals. I wanted each trainee at the Institute to regard his work not just as a job but as part of a great movement toward improving Indian rural life. For in my experience people fail oftener for lack of a great goal or objective than for any other reason.

Once again I turned to analogy and the bulletin board. The comparison between the fulfilled challenge of Everest and the unfulfilled challenge of India's problems caught the trainees' imagination. Their interest in Everest was great. Not only was it close to home, but Tensing, an Indian, was the only man besides Sir Edmond Hillary who reached the top.

The analogy was further developed in the classroom. Several parallels were drawn between the task of scaling Everest and the task of bettering India's rural life.

Enthusiasm. When Colonel Hunt, leader of the expedition, selected his staff, the number one requirement was that each man should really *want* to reach the top.

If Indian Rural Uplift is to succeed, everyone engaged in the task must *want* to achieve the goal. They must be concerned enough about the evils of poverty, illness, illiteracy, and superstition to do something about them.

Trainees inspect jowar variety plots at the Institute. Just as research was necessary for the successful assault on Everest, so is it necessary for the solution of India's food problems.

Research. For months before the assault, concentrated research was carried on to select the best oxygen equipment, the strongest tents, the warmest clothing, and the food which would give the quickest and most sustaining energy.

In like manner, agricultural research is necessary if India's goal is to be reached. The rust-resistant wheat variety, the jowar growing the greatest tonnage, the insecticide giving the best fly control — all these things and many others can be determined. Research seems slow, but in the end it is faster than aimless trial and error.

Demonstration. Before the first assault, Colonel Hunt had a trial run for the purpose of trying out or demonstrating the equipment, the time needed to scale an ice cliff, the ability of the team to work together.

Similarly the results of research should be tested in the villages to find out what will work and what will not work in actual practice.

If the demonstration or trial run is successful, then the big assault, or getting new ideas adopted on a widespread scale, should be planned for and promoted.

Sharing. Eight other expeditions preceded the Hunt attempt to climb Mt. Everest. All offered to share their aerial maps as well as their other knowledge and experience with Colonel Hunt. In fact the Swiss group that had made the last attempt told Colonel Hunt exactly where to find several containers of precious oxygen and food which they had abandoned. Colonel Hunt says that but for this the British group might not have reached the top.

The spirit of sharing was important in the assault on Everest. It is much more important in the assault on India's problem of feeding her increasing population.

Compassion. Colonel Hunt allowed a total of 13 days for reaching the top. Every hour was precious — even one wasted hour might cost the group the prize. The fourth day out, one of the men broke his leg. Colonel Hunt's immediate decision was to sacrifice one day and take him back to the camp below, even though this meant that the expedition might not reach the coveted goal. Saving the life of an individual was far more important than scaling the mountain.

So too, in India's new democracy, the individual is important, and compassion is felt for the unfortunate members of society. In some types of government, the individual is sacrificed to the State. If Indian democracy is to succeed, recognition must continue to be given to the rights and welfare of every human being.

An extension student at the Institute found this boy suffering from osteomyelitis and brought him to the hospital for treatment. As a result the boy was able to walk again. However, early and prolonged malnutrition could not be defeated, and anemia eventually claimed his life. As compassion is combined with increased production and with greater knowledge of food and nutrition, tragedies like this can be avoided in the future.

AN EFFECTIVE EDUCATION MOTIVATES ACTION

All the information in the world about better farming and living won't do the people of India any good unless they put the information into practice. Action is not only one of the ends of an effective education. It is also one of the best ways by which people learn.

Trainees take part in workshops

Workshops at the Institute gave the trainees a good chance to learn by doing. Besides gaining first-hand information about crops and soils, they also acquired a technique for teaching others.

Demonstrating the need for nitrogen. Members of the workshop filled four clay pots with a nitrogen-starved soil. In each they planted jowar. Nitrogen was added to three of the containers in three different forms: chopped-up legume used as a green manure, animal manure, and chemical nitrogen in the form of ammonium sulfate. The fourth container was left as a check.

Jowar gave a showy response to all three nitrogen carriers. In the container with untreated soil, however, it grew slowly, remained stunted, and turned sickly and yellow.

The four containers were exhibited at a farmers' fair or mela. The teachers who had made the exhibit were willing and anxious to explain every detail. Their voices had conviction, for they were explaining what they had proved for themselves.

Planning a program of building fertility. Workshop members planted various crops in 16″ x 24″ x 4″ flats. These flats represented actual fields as the class discussed the best crops for both the kharif (summer) and the rabi (winter) season. Seeing the growing crops helped the class to visualize them in the fields and enlivened a discussion which might otherwise have been drab and dull.

The group decided to plant gram after the paddy (rice); wheat after sun hemp; barley after the combined crop of cowpeas and mung; and lucern after the jowar. Planting two of the four "fields" to legumes each season cut down the need for chemical nitrogen. The only crop that needed additions of nitrogen was the paddy crop. Cattle manure was incorporated into the soil ahead of the barley crop. The class decided to use phosphate ahead of both wheat and lucern because they had seen how these two crops had responded to phosphorus in the research plots at the Institute.

Showing that soil needs a balanced diet. Twenty grains of gaihoon (wheat) were planted in each of four clay pots filled with calcareous river sand. Chemical nitrogen was added to the soil in the first container, phosphorus only to the second, and potash alone to the third. All three elements were placed in the fourth container.

Healthy, mature plants grew in the soil to which the three elements had been added, but in the other three containers the plants were dwarfed and sickly. This was a convincing demonstration of the need for a balanced or complete program of fertilization on this river sand.

A village gets rid of flies

Mahewa village, located a short distance from the Institute, was black with flies. Old men lying on their cots were too weak to fight them off. Babies were helpless. Here was an opportunity for the Institute students to learn by doing and at the same time give needed help and information to the villagers.

Controlling the flies in Mahewa became a project for the seven students enrolled in the third-year extension course. They started with a search for fly-breeding places. Thousands of flies were found hatching in human stools near the village and in six night-soil pits at the edge of the village. Hog manure at the Institute piggery was also a major breeding place.

Institute authorities agreed to haul the hog manure to the fields. The students then sprayed the piggery with water-soluble gammaxene, using 6 ounces per gallon of water. Seven days later the boys could locate only two flies at the piggery instead of the thousands that had previously swarmed there.

The students were convinced that flies could be controlled. They themselves had furnished the proof. They were ready for action.

Workshop members decided on the best rotation after growing crops in flats (left). At right three trainees display jowar grown with and without nitrogen. Learning by doing helps people to remember.

مکھیوں کو مارئیے یہ بیماری اور موت کا سبب ہیں
मक्खियों को मारिये, वे रोग और मृत्यु का कारण हैं।

A parade in Mahewa village whips up enthusiasm for fly-control project.

First, they started a "warm-up campaign" to show what could be done. Calling together a group of young men from the village, the trainees showed them the fly maggots hatching in the night soil. In two evenings the students and fifteen village youths buried 60 cubic feet of the night soil. The top of the soil in each pit was dusted with gammaxene powder to kill any maggots that were not buried deep enough. The outside walls of the village houses were sprayed with water-soluble gammaxene. The village boys dusted the human stools in the fields over a two-week period. For a few days Mahewa was practically free of flies.

However, the problem still hadn't been solved at its source; and to continue dusting with gammaxene indefinitely would be both costly and time-consuming. The need for bore-hole latrines was apparent. The trainees accordingly inaugurated a follow-up campaign which included the following steps:

1. A mass meeting was held in the village to explain the problem.
2. As night soil was added to the pits, villagers continued to dust it with gammaxene.
3. Young people staged a parade with anti-fly campaign banners.
4. All outside walls were sprayed, as well as most of the inner court yards.
5. The digging of bore-hole latrines was begun.

The campaign was successful because it had been preceded by the "warm-up" program. Both villagers and students had been convinced through demonstration that flies could be controlled in the village. They had been motivated to effective action.

Learning by doing gives satisfactions

One of the important by-products of "learning by doing" is the satisfaction that comes from being creative or producing something worthwhile. People who have never before done manual work can learn to appreciate its dignity.

The third-year extension course at the Institute emphasized "learning by doing." Each of the five students enrolled at the time was given five small plots, 1/30 acre in size. Two plots were used to grow lucern with and without phosphorus. Three plots were used to grow wheat. One of these was used as a check plot, another received 40 pounds of nitrogen, and the third was treated with both nitrogen and phosphate.

Village boys do their part in the fly-control campaign by spraying the outside walls of houses.

He was proud of his first full day's work.

It took seven hours for the boys to prepare the seedbed for the lucern, to inoculate the seed, and apply the phosphate. At the end of the day, one of the boys turned to me and said exultantly, "This is the first full day's work I have done in my life." Two other boys chorused, "Me, too."

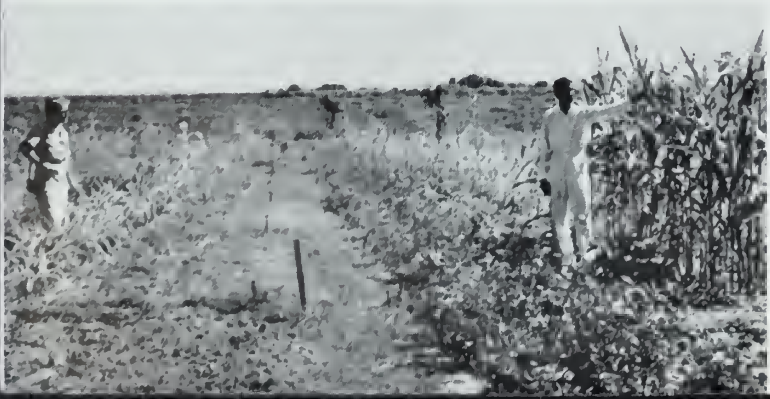
The boys all proved willing workers and participated enthusiastically in classroom discussions. All the problems of growing and harvesting crops took on new interest for them because they were actually doing the work themselves.

Verma acts on his own

Similar to the satisfaction of the five trainees was that of Verma, who, on his own initiative, bridged the gap between knowledge and action.

He was one of a social organizers' class at the Institute. On a tour of the farm the students had been shown the hunger signs of poor crops. They had also seen the magical response of corn and jowar to nitrogen and the luxuriant green growth of healthy, well-fed plants.

"He had his imagination fired." Verma stands by the maize to which he applied nitrogen. Mrs. Shuman stands amid some of the stunted maize growing on nitrogen-starved soil.



The night before the class was to leave for a three weeks' vacation, Verma came to me and asked for enough chemical nitrogen for a 400-square-foot garden. Each of the other 34 members had a similar-sized area in which he grew maize and vegetables. The land was so poor that the class got good physical exercise out of hoeing, but they did not have the experience of seeing the vegetables and maize produce a crop.

Verma applied the nitrogen in the early morning while his classmates slept. When they all returned from their vacation and went out to hoe the weeds, Verma insisted that I be present to see his classmates' surprise.

His vegetables had thrived. His maize stood 7 feet tall. The vegetables and maize on the other plots were yellow, dried-up and sickly. As I appeared, Verma's classmates came running over to his plot. One of them called, "Verma had his imagination fired!"

Verma had not only been motivated to action himself, but he had proved himself an effective extension worker.

Action—the sign of a leader

Already I have mentioned the research done by G. D. Singh, the manager of the Institute farm, and Dr. Dungan. Not only did Mr. Singh's training and enthusiasm make him a leader — but also his ability to reach a good decision and act upon it.

On June 25, 1954, when I returned from Kashmir, Mr. Singh greeted me with the news that the lucern demonstration plot had yielded 928 maunds of green feed per acre during the rabi season. I started to tell him that in the future I would use lucern as an annual, plowing it under each June for the heavy nitrogen-feeding crops like jowar and corn which grow in the kharif season.

Mr. Singh interrupted me by saying, "Pardon me, but before you tell me what you think let me tell you what I've done. I have plowed up the lucern and put the land into corn and jowar. If I leave the lucern during the monsoon the weeds and wet weather will greatly retard its growth. Around October each year I intend to reseed the lucern, using it as an annual even though it is usually recommended as a perennial."

Through close observation, Mr. Singh had thought through his problem and come to a logical conclusion. He then had acted upon his decision.

There are many other leaders like G. D. Singh in India. Their talents are essential for the improvement of rural India.

United action is effective action

The ultimate aim of good leadership, I believe, is effective action by a group for the good of all. The villagers of Mahewa showed what the people of a community can accomplish after a few leaders have inspired them to want a certain goal and then have shown them the way to reach it.

A similar story of united action under good leadership came from B. Prasad of Bombay State in answer to a question I had asked the Extension trainees: "How would you get villagers to not only want a school but to build and finance one?"

"I'll tell you how I did it," he replied. "I first talked to the people about a school, individually and in meetings. I took the leaders to see several schools in neighboring villages. There was more discussion and finally action. The key was taking them to see schools in other villages."

Prasad then concluded, "You have to get villagers to *want* what they ought to have — and then help them to get what they want."

United action promotes self-help and self-reliance

When the people of a community accomplish something through their own efforts, the reward is double: Not only do they have the material accomplishment itself, but they also have the self-respect and satisfaction that comes from knowing they achieved a goal through their own efforts.

Villagers build their own school.

The villagers of Beuhora joined together to build a much-needed road, two bullock carts wide. Not everybody who started, finished. Eighty-seven people worked the first day, 67 the second day, and only 37 the third day.

It was upon those who finished that the success of the road really depended. They are the ones who appear in the picture shown below, which I took on the day the road was finished.

This picture was used in newspapers, in the classroom, in a filmstrip, and on a bulletin board. Always, in using it, I made the point that two invisible people had helped complete the road — Mr. Self-Help and Mr. Self-Reliance.

They worked until the road was finished. Too often a road-building picture and accompanying ceremony come at the start of the project and due credit does not go to those whose labor has made the achievement possible.

AN EFFECTIVE EDUCATION BROADENS THE UNDERSTANDING

A broader understanding of one kind or another is of course the final product of all teaching, whatever technique is used. Understanding is also the basis for effective action. The success of the fly-control project at Mahewa, for example, depended on the villagers' understanding of why and how flies should be controlled. They understood because they had seen for themselves the effects of the warm-up campaign.

Similarly, the success of any other project for improving the farming methods or living standards of India will be determined by the understanding of her people. As more schools are built and more people learn to read and write, the task of reaching the people will become easier. Much has already been done. Much remains to be done.

"I have changed my mind"

That people usually understand best the things they can see was dramatically illustrated by an incident in the village of Sirsa. I was visiting the jowar demonstration plot there in early July, and with the tenant was thinning the plants. We wanted to reduce their number from 60,000 per acre to 30,000, to allow for sunlight and ade-

An extension worker teaches village women and girls with the aid of flannelgraphs. Education is as important for women as for men. Women are responsible for the kind and quality of food the family eats, as well as for the general care of the children. If India's children are to be healthy and well fed, women must understand the importance of sanitation, immunizations, and a balanced diet.

"I did not understand. The field is beautiful."

quate feeding. Suddenly I heard a slashing sound and looked up to see an old woman cutting at the plants with her khurpi.

"The American is a fool," she cried angrily. "If he can take out part of the plants, why not take them all out?"

She was the tenant's mother-in-law. As he grabbed her wrist, I explained the plant thinning by saying that if ten children were given a small bowl of rice containing only enough for two children, *all* would go hungry.

A week later I returned to the plot, to find the same woman standing on the ditch bank, gazing at the field. "I have changed my mind," she said, "I did not understand. The field is beautiful."

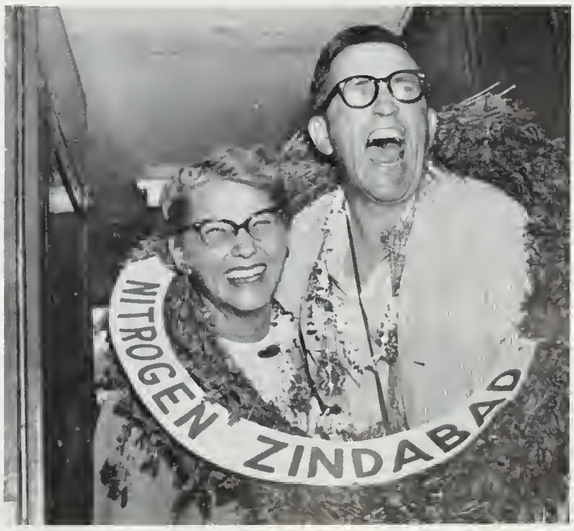
The radiant smile on her face as she spoke was to me a happy portent. For as deeper and broader understanding comes to the people of India, it is bound to cast its light on the future.

THE TWO YEARS ARE OVER

There came a day, of course, when my assignment was ended, and it was time for Mrs. Shuman and me to return to America. One of the most moving experiences of my life was the demonstration of friendship and appreciation that we received from our Indian friends on the day we left Allahabad.

About 150 students and staff members flocked to the station to see us off. In joking reminder that they had not forgotten the principles I had emphasized, they hung a huge garland of lucern around our necks and flourished banners carrying such slogans as, "To motivate, illustrate" and "An effective education fires the imagination."

Not only was the demonstration heartwarming to us personally, but the knowledge that our work had borne some fruit was the source of humble satisfaction. Looking back over the two years, I also saw my belief proved — that people, anywhere in the world, are much alike and once started in the right direction will go far beyond what their teachers have shown them.



The final crop
of any soil
is the people . . .

. . . and the spirit of the people

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